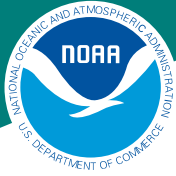


Non-indigenous Species Research

2009



**NOAA
FISHERIES
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Non-indigenous species (NIS) can affect the survival and distribution of key native species in all aquatic habitats. NWFSC research is aimed at

- **Identifying the distribution and abundance of NIS**
- **Evaluating the effects of NIS on threatened and endangered species, food species and the habitats on which they depend**

Non-indigenous species (NIS) invasions can have dramatic impacts on marine habitats and species; evaluating the effect of these invasions and exploring methods to mitigate those effects are critical areas of research at the Northwest Fisheries Science Center. Currently, center scientists are using a wide range of techniques to assess the distribution of NIS in marine, estuarine and freshwater habitats and evaluate their effects on marine species, anadromous salmonids and freshwater, estuarine and marine ecosystems.

NIS and salmon populations

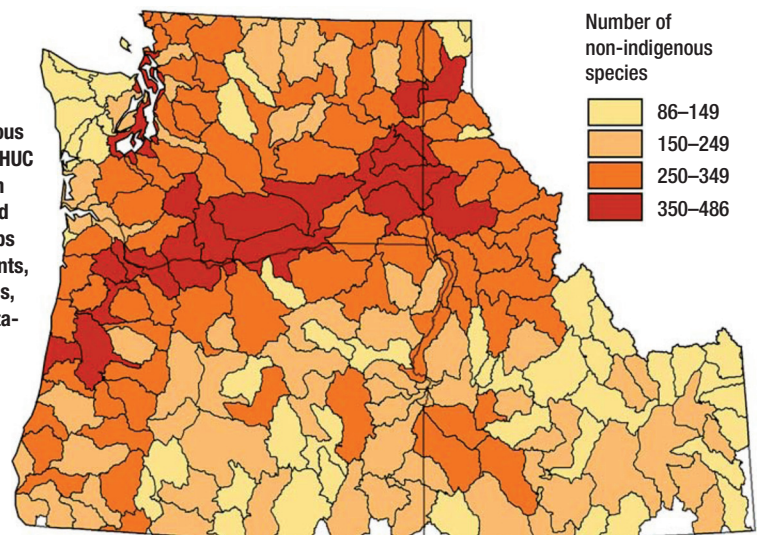
Hundreds of NIS inhabit Pacific NW watersheds, yet the impacts of these NIS on threatened and endangered populations of salmon have been largely ignored. Recently, NWFSC scientists documented both aquatic and terrestrial NIS in Pacific Northwest watersheds and synthesized results from studies that have addressed predatory impacts of NIS on salmon populations. Half of the freshwater fish species in the Pacific Northwest are introduced, and as many as 40 introduced species may be present in individual watersheds. This work suggests that cumulative NIS impacts are potentially quite large and should be considered in conjunction with the more commonly addressed impacts on salmonids -- hatcheries, harvest, hydro-system and habitat.

Evaluating ecosystem effects of NIS

In addition to affecting individual native species, NIS can also affect the structure and interactions within an ecosystem. Ongoing research at the NWFSC is aimed at increasing our understanding of these changes and supporting ecosystem-approaches to management. Currently NWFSC scientists are involved in a variety of projects of this type:

Number of non-indigenous species per fourth field HUC (hydrologic unit code) in Washington, Oregon, and Idaho. Taxonomic groups represented include plants, birds, fishes, amphibians, reptiles, mollusks, crustaceans, mammals, and other groups.

(Figure from Sanderson, et.al. 2009. BioScience)



Cordgrass (*Spartina alterniflora*)



- Forecasting range expansion of non-indigenous European green crab along coastal North America.
- Identifying origins of invasive tunicates in the Puget Sound basin using molecular genetic techniques.
- Quantifying changes in ecosystem productivity, community structure and food web dynamics as a result of NIS invasions in several estuaries of the Northeast Pacific using stable isotope analysis.
- Evaluating the effects of NIS such as brook trout on threatened and endangered species including anadromous salmonids.
- Examining the association between large-scale ocean conditions, such as the Pacific Decadal Oscillation, and the dispersal and population dynamics of invasive cordgrass (*Spartina alterniflora*) in Willapa Bay.
- Compiling comprehensive databases of aquatic and terrestrial NIS occurrence in the Pacific Northwest.



European green crab (*Carcinus maenas*)
Photo courtesy ODF&W

In the future, NWFSC scientists plan to address the effect of warm water fishes such as small-mouth bass on ESA-listed Pacific salmonids, and the mechanisms, dynamics and consequences of marine NIS introductions via the marine shipping trade.

Partnerships and Collaborations

In addition to publishing and presenting their NIS related research, NWFSC scientists are actively involved in outreach by collaborating with and providing guidance and consultations to many NIS committees, panels, research institutions and working groups. These include:

- NOAA's Aquatic Invasive Species Program and Pacific Marine Environmental Laboratory
- PICES Aquatic Non-indigenous Species Working Group
- Western Regional Panel on Aquatic Nuisance Species
- Aquatic Nuisance Species Task Force (ANSTF) Research Committee
- National Invasive Species Council/ANSTF Prevention Committee
- University of Washington (Department of Biology, School of Aquatic and Fishery Sciences, School of Oceanography)

Learn more & come see us in action

Sharing our work with other scientists, with policymakers, and with the public is important to us. To learn more about what we do, please visit our website at: www.nwfsc.noaa.gov.

To arrange a visit or obtain additional information, please call 206-860-3200.